WHAT IS CLAIMED IS:

1. A method for use in the diagnosis of endometriosis in a subject comprising the steps of:

detecting a test amount of a prothymosin gene product in a sample from the subject; and

comparing the test amount with a normal amount of the prothymosin gene product in a control sample,

whereby a test amount above the normal amount provides a positive indication in the diagnosis of endometriosis.

2. The method of claim 1 wherein the sample comprises ectopic endometrial tissue, eutopic endometrial tissue, peritoneal fluid, blood, vaginal secretion or urine.

3. The method of claim 1 wherein the prothymosin gene product is prothymosin mRNA or cDNA.

4. The method of claim 3 wherein the step of detecting comprises the steps of:

contacting the prothymosin mRNA or cDNA with a polynucleotide of at least 7 to about 50 nucleotides in length that specifically hybridizes to the prothymosin mRNA or cDNA and

detecting hybridization between the polynucleotide and the mRNA or cDNA.

5. The method of claim 4 wherein the polynucleotide comprises DNA or RNA.

6. The method of claim 4 wherein the polynucleotide comprises a nucleotide analog selected from the group consisting of phosphorothioates, phosphoramidates, methyl phosphonates, chiral-methyl phosphonates, 2-O-methyl ribonucleotides, and peptide-nucleic acids.

7. The method of claim 4 wherein the polynucleotide comprises a detectable moiety, and the step of detecting hybridization comprises detecting the moiety.

8. The method of claim 4 wherein the polynucleotide is a primer and the step of detecting hybridization comprises:

initiating reverse transcription of prothymosin mRNA with the primer, and

detecting a prothymosin mRNA reverse transcript;

whereby detection of the reverse transcript indicates that the polynucleotide has specifically hybridized to prothymosin mRNA.

9. The method of claim 4 wherein the prothymosin mRNA or cDNA is immobilized and the step of contacting comprises contacting the immobilized mRNA or cDNA with the polynucleotide.

10. The method of claim 4 wherein the polynucleotide is immobilized and the step of contacting comprises contacting the immobilized polynucleotide with the prothymosin mRNA or cDNA.

11. The method of claim 7 wherein the detectable moiety is a fluorescent label, a radioactive label, an enzymatic label, a biotinyl group, or an epitope recognized by a secondary reporter.

12. The method of claim 9 wherein the biological sample is a fixed tissue sample and the step of contacting comprises contacting the polynucleotide with the mRNA or cDNA *in situ* on the fixed tissue sample.

~~13. The method of claim 12 wherein the immobilized polynucleotide is comprised within a polynucleotide array.~~ Sub B2

14. The method of claim 3 wherein the step of detecting comprises the steps of:

amplifying the prothymosin mRNA or cDNA to produce an amplification product and

detecting the amplification product.

15. The method of claim 14 wherein the step of detecting the amplification product comprises:

contacting the amplification product with a polynucleotide of at least 7 to about 50 nucleotides in length that specifically hybridizes to the amplification product, and

detecting hybridization between the polynucleotide and the amplification product.

16. The method of claim 14 wherein the step of detecting the amplification product comprises determining the nucleotide sequence of the amplification product.

17. The method of claim 14 wherein the step of detecting the amplification product comprises determining the mass of the amplification product.

18. The method of claim 15 wherein the polynucleotide comprises DNA or RNA.

19. The method of claim 15 wherein the polynucleotide comprises a nucleotide analog selected from the group consisting of phosphorothioates, phosphoramidates, methyl phosphonates, chiral-methyl phosphonates, 2-O-methyl ribonucleotides, and peptide-nucleic acids.

20. The method of claim 15 wherein the polynucleotide comprises a detectable moiety, and the step of detecting hybridization comprises detecting the moiety.

21. The method of claim 20 wherein the detectable moiety is a fluorescent label, a radioactive label, an enzymatic label, a biotinyl group, or an epitope recognized by a secondary reporter.

22. The method of claim 1 wherein the prothymosin gene product is prothymosin polypeptide.

23. The method of claim 22 wherein the step of detecting comprises detecting prothymosin polypeptide by immunoassay.

24. The method of claim 22 wherein the step of detecting comprises contacting the sample with an affinity agent that binds to prothymosin polypeptide and detecting binding between the affinity agent and the prothymosin polypeptide.

25. The method of claim 22 wherein the step of detecting comprises detecting an analyte in the sample having the mass of prothymosin polypeptide.

26. The method of claim 23 wherein the immunoassay is non-competitive immunoassay.

27. The method of claim 23 wherein the immunoassay is competitive immunoassay.

28. The method of claim 23 wherein the immunoassay comprises detecting binding between the prothymosin polypeptide and an antibody comprising a detectable moiety selected from the group consisting of a fluorescent label, a radioactive label, an enzymatic label, a biotinyl group, and an epitope recognized by a secondary reporter.

29. The method of claim 24 wherein the step of detecting binding comprises detecting bound prothymosin polypeptide by mass spectrometry.

30. The method of claim 26 wherein the non-competitive immunoassay comprises the steps of:

capturing the prothymosin polypeptide from the sample on a solid phase with a first antibody specific for prothymosin polypeptide; and

detecting capture of the prothymosin polypeptide by contacting the solid phase with a second antibody specific for prothymosin polypeptide and detecting binding between the second antibody and prothymosin polypeptide.

31. The method of claim 26 wherein the non-competitive immunoassay comprises the steps of:

binding the prothymosin polypeptide from the sample to a solid phase; and

detecting the prothymosin polypeptide by contacting the solid phase with an antibody specific for prothymosin polypeptide and detecting binding between the antibody and prothymosin polypeptide.

32. A method for use in the monitoring the progress of endometriosis in a subject comprising the steps of:

detecting a first test amount of a prothymosin gene product in a sample from the subject at a first time;

detecting a second test amount of the prothymosin gene product in a sample from the subject at a second, later time; and

comparing the first test amount with the second test amount,

whereby an increase in the amount between the first time and the second time indicates progression of endometriosis and a decrease in the amount between the first time and the second time indicates remission of endometriosis.

33. A kit comprising a compound that binds a prothymosin gene product and instructions to (1) use the compound for detecting prothymosin in a patient sample, and (2) to diagnose endometriosis based on an elevated amount of the prothymosin gene product in the sample compared with a normal amount of prothymosin.

34. The kit of claim 33 wherein the prothymosin gene product is prothymosin mRNA or cDNA and the compound is a polynucleotide that hybridizes with prothymosin mRNA or cDNA under stringent conditions.

35. The kit of claim 33 wherein the prothymosin gene product is prothymosin polypeptide and the compound is an antibody that specifically binds to prothymosin polypeptide.

36. A method for use in the diagnosis of endometriosis in a subject comprising detecting a prothymosin gene product in endometriotic tissue from the subject *in vivo*, whereby detection of the gene product provides a positive indication in the diagnosis of endometriosis.

37. The method of claim 36 comprising administering to the subject a compound that specifically binds to a prothymosin gene product and detecting binding between the compound and the prothymosin gene product.

38. The method of claim 37 wherein the compound comprises a gamma-emitting or positron-emitting radioisotope and binding is detected by detecting the radioisotope by camera imaging or Geiger counter.

39. The method of claim 37 wherein the compound comprises a paramagnetic isotope and binding is detected by detecting the paramagnetic isotope by magnetic resonance imaging ("MRI").

40. The method of claim 37 wherein the compound is a polynucleotide that specifically hybridizes to prothymosin mRNA.

41. The method of claim 37 wherein the compound is an antibody that specifically hybridizes to prothymosin polypeptide.

42. A method for the treatment of endometriosis in a subject comprising:

administering to the subject a probe comprising a detectable label and a ligand that specifically binds a prothymosin gene product, to allow binding between the probe and the prothymosin gene product;

identifying an endometriotic lesion *in situ* by locating bound label; and

excising the endometriotic lesion.

43. The method of claim 42 comprising:

administering the probe into the peritoneum of the subject, wherein the probe comprises an antibody ligand that specifically binds prothymosin and a radioactive label;

identifying an endometriotic lesion *in situ* by locating bound probe with a Geiger counter; and

excising the endometriotic lesion laparoscopically.

44. A screening method for determining whether a compound modulates the expression of a prothymosin gene product in an endometrial cell comprising the steps of:

contacting the cell with the compound; and

determining whether expression of the prothymosin gene product is different that expression in a control cell which has not been contacted with the compound;

whereby a difference between expression in the endometrial cell and the control cell indicates that the agent modulates expression of the prothymosin gene product.

45. The method of claim 44 wherein:

the endometrial cell is comprised within endometriotic tissue cultured as a xenograft in a mouse;

the step of contacting comprises administering the compound to the mouse;

the step of determining comprises *in vitro* determination of expression of the gene product after removing the tissue from the mouse.

46. A method for the treatment of endometriosis in a subject comprising the step of administering to the subject a compound that decreases prothymosin activity in eutopic endometrial tissue or ectopic endometrial tissue in the subject.

47. The method of claim 46 wherein the compound inhibits expression of prothymosin mRNA.

48. The method of claim 46 wherein the compound inhibits activity of prothymosin protein.

49. The method of claim 46 wherein the compound is a small organic molecule.

50. The method of claim 46 wherein the compound is administered intraperitoneally.

51. The method of claim 47 wherein the compound comprises an inhibitory polynucleotide comprising a sequence of at least 7 nucleotides identical or complementary to prothymosin mRNA sequence, wherein the inhibitory polynucleotide inhibits transcription, processing or translation of prothymosin mRNA.

52. The method of claim 51 wherein the inhibitory polynucleotide is a polynucleotide comprising an antisense sequence of at least 7 nucleotides that specifically hybridizes to a nucleotide sequence within prothymosin mRNA, whereby the polynucleotide inhibits the activity of the prothymosin mRNA.

53. The method of claim 51 wherein the inhibitory polynucleotide is a ribozyme that cleaves prothymosin mRNA.

54. The method of claim 52 wherein the antisense sequence is between 10 and 50 nucleotides in length.

55. The method of claim 52 wherein the polynucleotide comprises a nucleotide analog selected from phosphorothioates, phosphoramidates, methyl phosphonates, chiral-methyl phosphonates, 2-O-methyl ribonucleotides and peptide-nucleic acids.

56. The method of claim 52 wherein the step of providing the cells with the polynucleotide comprises transfecting the cells with an expression vector comprising expression control sequences operatively linked to a nucleotide sequence encoding the antisense polynucleotide, whereby the vector expresses the polynucleotide.